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CALIBRATION STANDARD REQUIREMENT

FOR A

AUTO-MEASURING OSCILLOSCOPE

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PROCUREMENT PACKAGE

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CALIBRATION STANDARD REQUIREMENT FOR A AUTO-MEASURING OSCILLOSCOPE

1. SCOPE

1.1 Scope. This requirement defines the mechanical, electrical, and electronic characteristics for an Auto-Measuring Oscilloscope. This equipme is intended to be used by Navy personnel in shipboard and shorebase laboratories as part of the MET D 483 vibration calibration system. For t purposes of this requirement, the Auto-Measuring Oscilloscope shall b referred to as the Scope.

2. APPLICABLE DOCUMENTS

2.1 Controlling Specifications. MIL-T-28800, "Military requirement, Test Equipment for use with Electrical and Electronic Equipment, Genera specification for," and all documents referenced therein of the issues effect on the date of this solicitation shall form a part of this requireme

3. REQUIREMENTS

3.1 General. The Scope shall conform to the Type II, Class 5, Style E requirements as specified in MIL-T-28800 for Navy shipboard and shorebased as modified below. The use of material restricted for Navy use shall governed by MIL-T-28800.

3.1.1 Design and Construction. The Scope design and construction shall meet the requirements of MIL-T-28800 for Type II equipment.

3.1.2 Power requirements. The Scope shall operate from a source of 120V, 60 Hz (5% single phase input power as specified in MIL-T-28800.

3.1.2.1 Fuses or Circuit Breakers. Fuses or circuit breakers shall be provided. If circuit breakers are used, both sides of the power source sha be automatically disconnected from the equipment in the event of excessi current. If fuses are used, only the line side of the input power line, defined by MIL-T-28777, shall be fused. Fuses or circuit breakers shall readily accessible.

3.1.2.2 Power Connection. The requirements for power source connections shall be in accordance with MIL-T2-28800 with a 6-foot (1.8 m) minimum len cord.

3.1.3 Dimension and Weight. Maximum dimensions shall not exceed 13 inches (33.0 cm) in width, 7.5 inches (19.0 cm) in height, and 17.1 inc (43.4 cm) in depth. The weight shall not exceed 25 pounds (11.5 kg).

3.1.4 Lithium Batteries. Per MIL-T-28800, lithium batteries are prohibited without prior authorization. A request for approval for the use of lithi batteries, including those encapsulated in integrated circuits, shall submitted to the procuring activity at the time of submission of proposal Approval shall apply only to the specific model proposed.

3.2 Environmental Requirements. The Scope shall meet the environmental requirements for a Type II, Class 5, Style E equipment with the deviatic specified below.

3.2.1 Temperature and Humidity. The Scope shall meet the conditions below:

	Temperature((C)	Relative Humidity(%)
Operating	10 to 30	95
	30 to 40	75
Non-operating	-40 to 70	Not controlled

3.2.2 Electromagnetic Compatibility. The electromagnetic compatibility requirements of MIL-T-28800 are limited to the following areas: CE01, CE CS01, CS02, CS06, RE01, RE02 (14 kHz
to 1 GHz), and RS03.

3.3 Reliability. Type II reliability requirements are as specified in MIL-T- 28800.

3.3.1 Calibration Interval. The Scope shall have an 85% or greater probability of remaining within tolerances of all requirements at the end o 12 month period.

3.4 Maintainability. The Scope shall meet the Type II maintainability requirements as specified in MIL-T-28800 except the lowest discrete compon shall be defined as a replaceable assembly. Certification time shall n exceed 60 minutes.

3.5 Performance Requirements. The Scope shall provide the following capability as specified below. Unless otherwise indicated, all requiremer shall be met following a 30-minute warm-up period.

3.5.1 Vertical System. The Scope shall provide the following operating capabilities for the two vertical input channels.

3.5.1.1 Deflection Factor. The Scope shall have a minimum deflection factor range of 2mV/div to 5V/div in a 1-2-5 sequence. The deflection factor shall continuously variable between V/div settings.

3.5.1.2 Deflection Factor Accuracy. The Scope shall provide a deflection factor accuracy of at least (2% measured at any V/div setting with a mini 5 div display.

3.5.1.3 Bandwidth Limit. The Scope shall provide a means to limit bandwidth to between 10 mHz and 25 mHz.

3.5.1.4 AC-Coupled Lower (-3dB point). The Scope shall provide a low frequency -3dB cutoff point of 10 Hz or less.

3.5.1.5 Input Coupling. The Scope input coupling modes shall include AC, DC, and grounded.

3.5.1.6 Input Impedance. The Scope shall provide input impedance of 1 M(shunted by 15 pF and 50 ((nominal).

3.5.1.7 Frequency Response (-3dB Bandwidth). The high frequency -3dB Bandwidth of the scope shall be at least 100 MHz.

3.5.2 Horizontal System. The Scope shall provide the following operating capabilities.

3.5.2.1 Sweep Time Base Range. The Scope shall provide a minimum A channel sweep time base range of 500ms/div to 1us/div (to 100 ns with X10 mag) in a 2-5 sequence. The time base shall be continuously variable between time ba settings.

3.5.2.2 Sweep Time Base Accuracy. The Scope sweep time base shall have a minimum accuracy of ((0.7% of time interval + 0.6% of full scale).

3.5.3 Automatic Measurement Accuracy. The Scope shall provide the following measurement capability.

3.5.3.1 Period Accuracy. The Scope shall automatically measure period with a minimum accuracy of +0.9% + 500 ps.

3.5.3.2 Amplitude Accuracy. The Scope shall automatically measure amplitude with a minimum accuracy of (3% for displays of 5 divisions or less.

3.5.3.3 Rise Time, Fall Time Accuracy. The Scope shall automatically measure rise and fall time with a minimum accuracy of +5% + 3ns for transit times (10 ns.

3.5.3.4 Pulse Width Accuracy. The Scope shall automatically measure pulse width with a minimum accuracy of 0.9% + 1 ns.

3.5.4 Triggering. The Scope shall provide the following triggering capabilities.

3.5.4.1 Trigger Coupling Modes. The Scope trigger coupling modes shall include AC coupled, DC coupled, and high frequency rejected.

3.5.4.2 Trigger Level. The Scope shall trigger on a minimum display amplitude of one division.

3.6 Operating Requirements. The Scope shall provide the following operating capabilities.

3.6.1 Front Panel Control Requirements. All modes and functions shall be operable using front panel controls. The locations and labeling of indicators, controls, and switches shall provide for maximum clarity and easily understood operation without reference to tables, charts, or flow diagrams.

3.6.2 Programmability. The Scope shall meet the following programmability requirements.

3.6.2.1 IEEE-488.1. All modes and functions shall be fully remotely programmable via the IEEE-488.1 instrumentation bus. When operating the Scope via remote programming, all front panel controls shall be disabled, except for the on/off switch and the remote/local switch.

3.6.2.2 Programming Language. The Scope programming language shall conform to the Tektronix Standard Codes and Formats.

3.6.2.3 Automated Calibration Procedure Conformance. The Scope shall be compatible with the Navy's automated calibration procedures for vibration calibration as part of the MET D-483 system. The Scope shall be plug and play compatible with those procedures without the loss of performance or operational requirements of this Calibration Standard Requirement or those procedures. The Scope shall be compatible with the Navy's automated calibration procedures with no revision to said procedures.

3.6.3 Error Correction. During calibration, the Scope shall provide the capability to accept and store corrections for all measurement deviations from nominal conditions. This correction capability shall be operational from the front panel control and over the IEEE-488 bus. When the Scope is operated within its calibration period, it shall meet all the specified performance specifications without requiring the additional entry of any calibration factor or other correction data by the operator, including correction data entered by an instrument controller.

3.6.4 Local / Remote. The Scope shall have a local and remote operation mode. It shall be either manually or remotely programmable selectable according to paragraph 3.6.2. Manual selection shall be provided by a front panel switch. A means of indicating the operational mode shall be provided. When changing modes, all parameter values shall remain unchanged.

3.6.5 Self-Test. The self-test shall comprise two selectable levels, an operational test to determine if the instrument is operationally ready, and second level diagnostic test to diagnose and isolate faulty field replaceable modules. When the self-test function is initiated, an auto-sequenced internal operational test shall be performed. The diagnostic test shall be selectable only by deliberate operator command.

3.6.6 IEEE Interface. The Scope shall have an IEEE-488.1 interface connector with the following capabilities: SH1, AH1, T6, L4, SR1, RL1, DT1. Serial poll capability shall be provided.

3.6.7 Compatibility. The Scope shall be tested for compatibility with the IEEE-488 bus and the John Fluke model 1722A/AP instrument controller.

3.7 Manual. At least two copies of an operation and maintenance manual shall be provided. The manual shall meet the requirements of MIL-M-7298.

3.7.1 Calibration Procedure. The manual shall provide a calibration procedure in accordance with MIL-M-38793.